

Claims

Claims 1-12: (canceled)

13. (previously presented) A sensor arrangement for use in seismic investigation of geological formations below the seabed comprising:

a plurality of sensor nodes (20), which are positioned for deployment on the seabed to acquire pressure waves and shear waves from the geological formations and to transfer seismic data to a surface receiver, wherein each sensor node (20) comprises a substantially cylindrical skirt (22) having a bottom with an opening, the bottom adapted to penetrate into the seabed, and at least a first geophone (30) that is connected to the skirt (22).

Claims 14-15: (canceled)

16. (previously presented) A sensor arrangement according to claim 13, further comprising a housing (27) that encloses the first geophone (30) and is positioned at the top of the cylindrical skirt (22).

17. (previously presented) A sensor arrangement according to claim 16, further comprising an open cage (37) that encloses at least a first hydrophone (38) and is positioned above the housing (27).

18. (previously presented) A sensor arrangement according to claim 16, further comprising a grip (40) that is fixed at the top for use with a ROV ROT.

19. (previously presented) A sensor arrangement according to claim 16, wherein each sensor node (20) is connected to a control unit (11) through an acoustic insulated cable (21).

20. (previously presented) A sensor arrangement according to claim 13, wherein each cylindrical skirt is manufactured of aluminum.

21. (previously presented) A sensor arrangement according to claim 17, wherein a hydrophone (38) is placed about 10 cm above the geophone (30).

22. (previously presented) A sensor arrangement according to claim 16, wherein the housing (27) encloses three geophones (30-32) that are positioned with a 90° angle in relation to each other, and a tiltmeter.

Claim 23: (canceled)

24. (previously presented) A sensor arrangement according to claim 19, wherein the cable (21) is received into the sensor node (20) through an outlet formed in the upper part of the skirt (22).

Claims 25-30: (canceled)

31. (previously presented) A sensor arrangement according to claim 13 further comprising a housing (27) that encloses at least one geophone (30), and the geophone is positioned at the top of the cylindrical skirt (22) to contact the surrounding sediments when the housing is lowered into the seabed.

Claims 32-40: (canceled)

41. (previously presented) The sensor arrangement according to claim 24 wherein the outlet is adapted to discharge sediment when the sensor node is deployed.

42. (New) A sensor arrangement for use in seismic investigation of geological formations below the seabed comprising:

a plurality of sensor nodes (20) that are positioned for deployment on the seabed to acquire pressure waves and shear waves from the geological formations and to transfer seismic data to a surface receiver, each sensor node (20) comprises:

(a) a substantially cylindrical skirt (22) having a top and a bottom, the bottom has an opening and is adapted to penetrate into the seabed, the skirt also has a pair of outlets (24, 25) adapted to discharge sediment when the sensor node is deployed;

(b) a plate (23) attached to the top of the skirt (22);

(c) a geophone housing (27) for holding at least a first geophone (30), the geophone housing (27) extends into the opening in the skirt (22) and comprises an upper portion (28) attached to the plate (23);

(d) a hydrophone cage (37) for holding a hydrophone (38), the hydrophone cage (37) is positioned above the plate (23) and comprises a cover (29) that attaches to the upper portion (28) of the geophone housing (27) and a plurality of poles (36) extending upward from the cover (29);

(e) a grip (40) that is adapted to be gripped by a gripping tool on a ROV, the grip is attached to a plate (39) that is attached to tops of the poles (36);

(f) an acoustic insulated cable (21) having a first end adapted to be connected to an associated control unit (11) and a second end operatively connect to the geophone housing (27), the cable being received through one of the outlets (24, 25).

43. (New) A sensor arrangement according to claim 42, wherein the geophone housing (27) encloses three geophones (30-32) that are positioned with a 90° angle in relation to each other, and a tiltmeter.

44. (New) A sensor arrangement according to claim 43, wherein the geophone housing (27) further comprises a coupling card (33).

45. (New) A sensor arrangement according to claim 43, wherein the geophone housing (27) further comprises an attachment plate (34) that attaches to a cable connection (35) of the cable (21).

46. (New) A sensor arrangement according to claim 43, wherein the geophone housing (27) is substantially cylindrical and the upper portion (28) of the geophone housing (27) comprises a flange.

47. (New) A sensor arrangement according to claim 43, wherein the cylindrical skirt is manufactured of aluminum.

48. (New) A sensor arrangement according to claim 43, wherein the hydrophone (38) is positioned about 10 cm above at least one of the geophones (30-32).

49. (New) A sensor arrangement according to claim 43, wherein the bottom of the skirt (22) comprises teeth to achieve better contact with the seabed sediments.